

## Algebra 1, Semester A

### Course Overview

Algebra 1, Semester A, is a single-semester course designed to cultivate and periodically assess your subject-matter knowledge while strengthening your mathematical skills. This course includes lessons that focus on the relationships of linear and nonlinear equations. You'll learn to create, graph, and solve linear and exponential equations and inequalities. You'll also use function notation to describe relationships between quantities and interpret function notation accurately to solve problems. Toward the end of this course, you'll study transformations of linear and exponential functions.

### Course Goals

By the end of this course, you will be able to do the following:

- Interpret and create graphs of linear and nonlinear relationships.
- Identify the parts of an expression and interpret what each part represents in context.
- Solve linear equations and inequalities for a variable.
- Create linear equations and inequalities in one variable.
- Solve systems of linear equations using algebraic and graphical methods.
- Solve linear and exponential equations using graphs.
- Create, graph, and solve exponential equations and inequalities in one or two variables to represent and solve problems.
- Use a function to represent a sequence and the terms of the sequence that the function defines.
- Calculate and interpret the average rate of change for a linear or exponential function over an interval.
- Compare representations of linear and exponential functions.
- Create and combine linear and exponential functions using arithmetic operations to build functions.
- Identify the effects of linear and exponential function transformations graphically and algebraically.

## **Math Skills**

Middle school mathematics is a prerequisite for Algebra 1A. Before beginning this course, you should be able to do the following:

- Solve problems involving operations with real numbers.
- Understand linear relationships through past work with ratios, proportions, and rates.
- Know the meaning of a line, and be able to make predictions from linear relationships.
- Collect, analyze, and display data to solve problems.

## **General Skills**

To participate in this course, you should be able to do the following:

- Understand the basics of spreadsheet software, such as Microsoft Excel or Google Spreadsheets, but having prior computing experience is not necessary.
- Communicate through email and participate in discussion boards.

*For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Student Orientation document, found at the beginning of this course.*

## **Credit Value**

Algebra 1, Semester A, is a 0.5-credit course.

## **Course Materials**

- notebook
- computer with Internet connection and speakers or headphones

# Course Pacing Guide

This course description and pacing guide is intended to help you keep on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class.

## Unit 1: Quantities and Expressions

### Summary

This unit begins with a Course Activity designed to introduce you to the concept of algebra. You'll then move on to study quantities and expressions. Quantities are expressed in many different ways: two of them are graphs and expressions. You'll begin by studying graphical representations of quantities and the relationships between them. Then you'll learn about expressions and how to interpret their parts. Finally, you'll examine the connection between radical symbols and fractional exponents.

Day	Activity/Objective	Type
1 day: 1	<b>Syllabus and Student Orientation</b> <i>Review the Student Orientation and Course Syllabus at the beginning of this course.</i>	Course Orientation
3 days: 2–4	<b>Introduction to Algebra</b> <i>Improve your ability to study algebra by exploring its history and nature, as well as the ways in which it helps people solve problems.</i>	Course Activity
3 days: 5–7	<b>Graphs of Linear Relationships</b> <i>Use appropriate units and quantities to interpret and create graphs of linear relationships.</i>	Lesson
3 days: 8–10	<b>Graphs of Nonlinear Relationships</b> <i>Use appropriate units and quantities to interpret and create graphs of nonlinear relationships.</i>	Lesson
3 days: 11–13	<b>Interpreting Expressions</b> <i>Identify the parts of an expression and interpret what each part represents in context.</i>	Lesson

3 days: 14–16	<b>Radicals and Properties of Exponents</b> <i>Apply properties of integer exponents to rational exponents and translate between expressions with rational exponents and radical notation.</i>	Lesson
4 days: 17–20	<b>Unit Activity and Discussion—Unit 1</b>	Unit Activity/ Discussion
1 day: 21	<b>Posttest—Unit 1</b>	Assessment

## Unit 2: Using Linear and Exponential Relationships to Model Problems

### Summary

In this unit, you'll rearrange and then create linear and exponential equations and inequalities in one and two variables to solve problems. You'll learn how to combine multiple equations and inequalities to create systems of equations and inequalities and then determine the viability of their solutions.

Day	Activity/Objective	Type
3 days: 22–24	<b>Rearranging and Solving Linear Equations and Inequalities</b> <i>Rearrange and solve linear equations and inequalities for a variable and identify the property of equality that justifies each step of the solution.</i>	Lesson
2 days: 25–26	<b>Creating One-Variable Linear Equations and Inequalities</b> <i>Create linear equations and inequalities in one variable and use them to solve problems.</i>	Lesson
3 days: 27–29	<b>Creating One-Variable Exponential Equations and Inequalities</b> <i>Create exponential equations and inequalities in one variable and use them to solve problems.</i>	Lesson
3 days: 30–32	<b>Creating Two-Variable Linear and Exponential Equations</b> <i>Create two-variable linear and exponential equations and graph them to display the relationship.</i>	Lesson

<b>Day</b>	<b>Activity/Objective</b>	<b>Type</b>
2 days: 33–34	<b>Creating Systems of Equations and Inequalities</b> <i>Create systems of equations and inequalities that represent boundaries from a context and determine the viability of solutions.</i>	Lesson
4 days: 35–38	<b>Unit Activity and Discussion—Unit 2</b>	Unit Activity/ Discussion
1 day: 39	<b>Posttest—Unit 2</b>	Assessment

## Unit 3: Methods of Solving Linear and Exponential Equations, Inequalities, and Systems

### Summary

In the third unit, you'll use algebraic and graphical methods to solve linear and exponential equations. You will also solve linear inequalities and systems of linear inequalities in two variables on a coordinate plane using graphical methods.

<b>Day</b>	<b>Activity/Objective</b>	<b>Type</b>
2 days: 40–41	<b>Solving Systems of Equations</b> <i>Solve systems of linear equations using algebraic and graphical methods.</i>	Lesson
2 days: 42–43	<b>Solving Equations by Graphing</b> <i>Use graphing, tables, and successive approximation to solve linear and exponential equations.</i>	Lesson
2 days: 44–45	<b>Graphing Linear Inequalities</b> <i>Graph solutions to linear inequalities and systems of linear inequalities in two variables on a coordinate plane.</i>	Lesson
4 days: 46–49	<b>Unit Activity and Discussion—Unit 3</b>	Unit Activity/ Discussion
1 day: 50	<b>Posttest—Unit 3</b>	Assessment

## Unit 4: Function Representations

### Summary

In this unit, you'll use function notation and function concepts to describe the relationships between quantities and to solve problems. You'll also use functions to represent a sequence. These functions will be linear or exponential, and you'll learn to interpret key features of their graphs in various contexts. In addition to graphical key features, you'll calculate the average rate of change for a linear or exponential function over an interval and compare linear and exponential functions.

Day	Activity/Objective	Type
2 days: 51–52	<b>Function Notation and Function Concepts</b> <i>Use function notation to describe relationships between quantities and interpret function notation accurately to solve problems.</i>	Lesson
2 days: 53–54	<b>Sequences as Functions</b> <i>Use a function to represent a sequence and the terms of the sequence that the function defines.</i>	Lesson
3 days: 55–57	<b>Interpreting Linear and Exponential Functions and Their Graphs</b> <i>Show a linear or exponential relationship between two quantities by sketching a graph that reveals key features and use a table or graph to interpret key features in context.</i>	Lesson
3 days: 58–60	<b>Average Rate of Change with Linear and Exponential Functions</b> <i>Calculate and interpret the average rate of change for a linear or exponential function over an interval.</i>	Lesson
3 days: 61–63	<b>Graphing Linear and Exponential Functions and Their Key Features</b> <i>Graph linear and exponential functions to show intercepts and end behavior.</i>	Lesson
3 days: 64–66	<b>Comparing Linear and Exponential Functions</b> <i>Compare representations of linear and exponential functions.</i>	Lesson

4 days: 67–70	<b>Unit Activity and Discussion—Unit 4</b>	Unit Activity/ Discussion
1 day: 71	<b>Posttest—Unit 4</b>	Assessment

## Unit 5: Building Linear and Exponential Functions

### Summary

In this unit, you'll determine functions used to model arithmetic and geometric sequences and then combine linear and exponential functions to build functions. You'll identify the effects of linear and exponential function transformations graphically and algebraically. Finally, you will construct functions that model situations and interpret what the parameters of these functions represent.

<b>Day</b>	<b>Activity/Objective</b>	<b>Type</b>
3 days: 72–74	<b>Explicit and Recursive Functions</b> <i>Determine explicit and recursive functions that model arithmetic or geometric sequences.</i>	Lesson
3 days: 75–77	<b>Combining Functions</b> <i>Create and combine linear and exponential functions using arithmetic operations to build functions.</i>	Lesson
4days: 78–81	<b>Linear and Exponential Function Transformations</b> <i>Identify the effects of linear and exponential function transformations—specifically vertical exponential translations and all linear transformations—both graphically and algebraically.</i>	Lesson
3 days: 82–84	<b>Modeling and Interpreting with Linear and Exponential Functions</b> <i>Show how linear and exponential functions grow or decay, construct functions that model situations given in different forms, and interpret what the parameters of these functions represent.</i>	Lesson
3 days: 85–87	<b>Unit Activity and Discussion—Unit 5</b>	Unit Activity/ Discussion

1 day: 88	<b>Posttest—Unit 5</b>	Assessment
1 day: 89	<b>Semester Review</b>	
1 day: 90	<b>End-of-Semester Exam</b>	Assessment